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ENGLISH TRANSLATION OF SPECIFICATION
(without amendments)

SPECIFICATION

Soccer Ball Type Room Structure

Field of the Invention

This invention relates to a soccer ball type room structure having a living space inside, further relate to a soccer ball type room structure that can be easily built and transported and thus can be used for various purposes.

Background of the Invention

In recent years living in closer touch with nature has become increasingly popular. Although to think about the issues of the global environment it is a good idea to live closer to the splendor of nature, it should not be done at nature's expense. Similarly, although it is important to "enjoy" living close to nature, it is also important not to put oneself in danger of facing with nature's force in order to achieve this.

After repeated examinations and many considerations, the inventor has come to realize that using a structure made of the combination of hexagonal shape and pentagonal shape can be quite effective to form a living space, which makes it possible for people to commune with nature while protecting them from a harsh environment, and also which is easy to built and transport.

The idea of using pentagonal and hexagonal shapes has also been used in other patented structures, such as "Dome Structure" (JP Patent 2003-27595, hereinafter referred to as "Reference 1"), and "Construction of Spherical Structures for Use as Whole or Partial Building Units" (JP Patent 2001-132893, herein after referred to as "Reference 2").

As shown in Fig. 10 in Reference 1, the "Dome Structure" is "composed of supports connected together in a triangular truss, forming a rigid frame that is nearly half-spherical. The frame is covered with interlocking pentagonal and hexagonal panels". The invention of Reference 1 was developed to address a problem that "previous designs of dome-shaped structures were hampered by problems concerning weight, and were difficult to design and were time-consuming to assemble" as stated in paragraph 0007 of the specification.

In paragraph 0032, Patent 1 states that "this new design reduces stress on the now

shorter beams of the structure, resulting in a lighter frame." However, since this structure is a "dome shape", it is not designed for the use under a stormy environment, or on water, thus this structure cannot form a living space for communing with nature.

The "spherical structure" described in Reference 2 is, as shown in Fig. 11, "a unit composed of interconnected flat hexagonal panels; 3 of the 6 panels can be removed in order to connect the unit to another identical unit for the formation of a larger structure, and are easily interchangeable." In paragraph 0007 of Reference 2 it states: "The object of this invention is to provide a strong, light framework that is easily combined with other like modules to easily create a larger structure."

Paragraph 0038 of Reference 2 states that this invention "facilitates the assembly of large, lightweight structure that can be easily assembled"; however, since structure is a frame unit as shown in Fig. 11 it is not designed for the use under a stormy environment, or on water, thus this structure cannot form a living space for communing with nature.

Keeping the above examples and their problems in mind, the inventor of this invention has developed this invention after many considerations and experiments to form a living space, which makes it possible for people to commune with nature while protecting them from a harsh environment, and also which is easy to built and transport.

Accordingly, the object of this invention is to provide soccer ball type room structures that can provide a living space to enjoy communing with nature while they can be easily built and transported, and can be used in a stormy environment or on water.

Summary of the Invention

In order to accomplish the above object, the means that this invention adopted according to claim 1 explain with the numbers used in the explanation of the best mode of this invention as follows:

"A soccer ball type room structure (100) (herein after referred to as SBTRS) comprising a plurality of regular hexagonal first panels (10), and a plurality of regular pentagonal second panels (20) having sides of the same length as sides of said first panels (10), said first and second panels being mounted with each other to form a living space inside of the said structure;

said first panels (10) being fixed to first installation frames (11) having same contours as contours of said first panels, first panel end faces (11a) of said first installation frames (11) being configured at approximately 69° relative to upper surfaces of said first panels (10) on said first installation frames (11), and the second panel end faces (11b) of said first installation frames (11) being configured at approximately 72° relative to the upper surfaces of said first panels (10) on said first installation frames (11);

said second panels (20) being fixed to second installation frames (21) having same contours as said second panels, end faces (21a) of said second installation frames (21) being configured at approximately 72° relative to upper surfaces of the second panels (20) on said second installation frames."

That is, the SBTRS (100) as shown in Figs 1 to 3 is constructed, as shown Figs. 6 and 7, by connecting the hexagonal first panels (10), which are each integrally fixed on the top surface of one of the installation frames (11) as shown in Fig. 5 (a), and the pentagonal second panels (20), which are each integrally fixed on the top surface of one of the installation frames (21) as shown in Fig. 5 (b).

Since the outer shape of the structure is based on that of a soccer ball, the first panels (10) and the second panels (20) shown in Fig. 5 follow a connected pattern as shown in Fig. 8. In the pattern, the first panels (10) are always connected together in pairs as shown in Fig. 8 such as a pair of panels connected horizontally in the upper part of Fig. 8 and a pair of panels connected vertically in the lower parts of Fig. 8, and each pair of the first panels (10) are connected with one of the second panels (20). In this manner, the SBTRS (100) contains 12 pentagonal second panels (20) and 20 hexagonal first panels (10), which form 32 faces for the structure.

Since the SBTRS (100) is not made of soft materials like a real soccer ball, the end faces of the first installation frames (10) and the second installation frames (20) each supporting the first panel (10) or the second panel (20) must be inclined faces as shown in Figs. 6 and 7. Specifically, as described above, the first panel end faces (11a) of the first installation frames (11) are configured at approx. 69° relative to the upper surfaces of the first panels (10) on the first installation frames (11), the second panel end faces (11b) of the first installation frames (11) are configured at approx. 72° relative to the upper surfaces of the first panels (10) on the first installation frames (11), and the end

faces (21a) of the second installation frames (21) are configured at approx. 72° relative to the upper surfaces of the second panels (20) on the second installation frames (21).

Although the hexagonal and pentagonal panels are of different shape, they are all flat, which facilitates their transport and storage. Furthermore, by following the simple assembly rules as shown in Figs. 6, 7 and 8, one can easily assemble a SBTRS (100). Since this structure is meant for human habitation, parts such as a door (51), windows (52), a ventilation port (54), an exhaust port (55), or a underwater view port (53) are pre-built into the panels, and the panels having the parts need to in place during assembly.

The SBTRS (100) shown in Fig. 1 is a lodge type suitable for camping use, and is built upon a foundation (60) with a door (51) and windows (52) built into the structure's center. In this case the structure can be stabilized with rope fixed to ground stakes (62), and a ladder (61) can be used to reach the door (51). The windows (52), if they are configured on the upper part of the SBTRS (100), can be used for astronomical observation.

The SBTRS (100) shown in Fig. 2 is also a type suitable for outdoor leisure activities, and is semisubterranean, which enables the user to gain entry without the need of a ladder (61). The SBTRS (100) shown in Fig. 3 is meant to float on water, and contains an underwater view port (53) built into its base.

Either type of these SBTRS (100) forms a living space protected by the first panels (10) and second panels (20), thus it is able to block the harsh sunlight and stormy weather. Therefore, the function of the SBTRS completely differs from that of the dome-shaped structure (Fig. 10) and the spherical structure (Fig. 11). In addition, its various parts, such as the door (51) and the underwater view port (53) are built-in, so that it allows the owner to freely decide their position during assembly depending on the desired purpose. The SBTRS (100) can exist in any natural setting and releases no harmful gases or waste liquids into the environment.

Accordingly, the SBTRS (100) as described in claim 1 can provide a living space to enjoy communing with nature while they can be easily built and transported, and can be used in a stormy environment or on water.

The means that the invention according to claim 2 employs is explained as follows:

"A soccer ball type room structure (100) comprising a plurality of regular hexagonal first panels (10), and a plurality of regular pentagonal second panels (20) having sides of same length as sides of said first panels (10), said first and second panels being combined with each other to form a living space inside;

said soccer ball type room structure (100) further comprising a soccer ball shaped support framework (30) consisting of a plurality of angle braces with identical length connected to each other at ends of said angle braces and having a plurality of mounting openings (31) on which the first panels (10) and second panels (20) are each mounted. "

That is, the SBTRS (100) as described in claim 2 and as shown in Fig. 9 comprising a plurality of angle braces connected to each other at both ends, forming a support framework (30) comprising mounting openings (31).

The support framework (30) is meant to be assembled at a factory; the first and second panels would be mounted onto the framework at the building site. This would make the unassembled structure lighter and facilitate its transport. In this fashion, the framework itself is the same as the spherical structure unit shown in Fig. 11.

At the building site, the first panels (10) and second panels (20) shown in Fig. 5 are each mounted onto one of the mounting openings (31) of the support framework (30) as shown in Fig. 9 with arrows. This SBTRS (100), based on the support framework (30), can be used for any of the purposes shown in Figs. 1 to 3.

Accordingly, the SBTRS (100) as described in claim 2 can also provide a living space to enjoy communing with nature while they can be easily built and transported, and can be used in a stormy environment or on water.

Brief Description of Drawings

Fig. 1 is a front view of a SBTRS (100) designed to be ground-based.

Fig. 2 is a front view of a SBTRS (100) designed to be semisubterranean.

Fig. 3 is a front view of a SBTRS (100) designed to be used on water.

Fig. 4 is a cross-sectional end view taken along line 1-1 of the SBTRS (100) shown in Fig. 1.

Fig. 5 is a regular hexagonal first panel (10) (A) and a regular pentagonal second panel (20) (B).

Fig. 6 is a partial enlarged cross-sectional view of two first panels (10) mounted on first installation frames (11).

Fig. 7 is a partial enlarged cross-sectional view of a first panel (10) and a second panel (20), mounted on a first installation frame (11) and a second installation frame (12) respectively, and connected together.

Fig. 8 is a top plan view of a basic pattern in which the first panels (10) and second panels (20) are interconnected.

Fig. 9 is a front view of a SBTRS (100) using a support framework (30).

Fig. 10 is a top plan view of a conventional structure.

Fig. 11 is a top plan view of another conventional structure.

Explanations of The Letters of Numerals:

100	Soccer ball type room structure
10	First panel
11	First installation frame
11a	First panel end face
11b	Second panel end face
20	Second panel
21	Second installation frame
21a	End face
30	Support framework
31	Mounting opening
40	Sealant

41 Bolt
51 Door
52 Window
53 Underwater view port
54 Ventilation port
55 Exhaust port
60 Foundation
61 Ladder
62 Ground stake

Best Mode for Carrying out the Invention

Now, the best mode for carrying out the invention is explained in a first embodiment shown Figs. 1 to 8 and a second embodiment shown Fig. 2, respectively.

[Embodiment 1]

A ground based SBTRS (100) as shown Fig. 1, a semisubterranean SBTRS (100) as shown Fig. 2, and a waterborne SBTRS (100) shown Fig. 3 are all composed of a plurality of regular hexagonal first panels (10) and a plurality of regular pentagonal second panels (20) having the sides of the same length as those of the first panels (10), the first panels (10) and the second panels (20) being combined with each other to form a living space inside of the SBTRS (100).

The first panels (10), as shown in Fig. 5(A), are fixed to first installation frames (11) having the same contours as the first panels (10), by the rear surface of the first panels; the second panels (20), as shown in Fig. 5(B), are fixed to second installation frames (21) having the same contours as those of the second panels (20), by the rear surface of the second panels (20). Therefore, the rigidity of the first panels (10) and the second panels (20) are secured by the first installation frames (11) and the second installation frames (21), thus the rigidity of the whole SBTRS is secured.

For fixing the first panels (10) and the second panels (20) to the first installation frames (11) and the second installation frames (21) respectively, as shown in Figs. 6 and 7, sealant (40) made of shock-absorbing material such as rubber is used between them to secure the shock-absorption and the airtightness. This sealant (40) is also applied to the joints between first panel end faces (11a), and between a second panel end face

(11b) and an end face (21a). Also, it is easy to thoroughly insulate the SBTRS (100) by applying insulating material to the reverse side of the first installation frames (11) and second installation frames (21) (at the bottom side in Fig. 7).

In order to form a soccer ball shape by connecting the first and second installation frames, the angle of inclination of the joints between first mounting frames (11) and the joints between a first mounting frame (11) and a second mounting frame (21) are slightly different. This is due to the difference in shapes of the hexagonal first panels (10) and the pentagonal second panels (20).

Accordingly, in this best mode, the first panel end faces (11a) of the first installation frames (11) are configured at approximately 69° and the second panel end faces (11b) of the first installation frames (11) are configured at approximately 72° relative to the upper surfaces of the first panels (10) on the first installation frames (11). On the other hand, with respect to the second panel (20), the end faces (21a) of the second installation frames (21) are configured at approximately 72° relative to the upper surface of the second panel (20) on the second installation frames (21).

With respect to the connection between a pair of the first installation frames (11) or between one of the first installation frames (11) and one of the second installation frames (21), as shown in Figs. 6 and 7, the connection can be achieved by putting bolts (41) through the edges of the first installation frames (11) and/or the second installation frames (21) and fixing the bolts with nuts. The SBTRS (100) can thus be built from the ground up. However, the SBTRS (100) can be built by connecting 6 sets of pre-assembled panels as shown in Fig. 8 one after another.

In addition, since this SBTRS (100) is meant for human habitation, as shown Fig.1 to 3, parts such as a door (51), windows (52), a ventilation port (54), an exhaust port (55), and a underwater view port (53) may be pre-built into the first panels (10) and/or the second panels (20).

The SBTRS (100) shown in Fig. 1 is a lodge type suitable for camping use, and is built upon a foundation (60), with a door (51) and windows (52) built into the structure's central part. In this case the structure can be stabilized with ground stakes (62), ropes, or the like, and a ladder (61) can be used to reach the door (51). The windows (52) may be configured on the upper part of the SBTRS (100) for the purpose of

astronomical observation.

The SBTRS (100) shown in Fig. 2 is also a type suitable for outdoor leisure activities, and is semisubterranean, which enables the user to gain entry without the need of a ladder (61). The SBTRS (100) shown in Fig. 3 is meant to float on water, and contains an underwater view port (53) configured on its lower part.

[Embodyment 2]
A SBTRS (100) is provided in Fig. 9 according to the second embodiment, the SBTRS (100) also forming a living space inside by connecting a plurality of regular hexagonal first panels (10) and a plurality of regular pentagonal second panels (20) having the sides of the same length as those of the first panels (10). However, this SBTRS (100) differs from that of the first embodiment in that this SBTRS adopts a support framework (30) as its frame.

The support framework (30) consists of a plurality of angle braces of identical length connected to each other at their ends, as shown in Fig. 9, to form a soccer ball shape having a plurality of mounting openings (31), on which first hexagonal and second pentagonal panels are mounted (as shown in Fig. 9 with arrows).

The first panels (10) and second panels (20) used for the SBTRS (100) of the second embodiment may have the first installation panels (11) and one of the second installation panel (21) respectively. However, since the support framework (30) maintains its own rigidity, the first panels (10) and second panels (20) can be used alone, without the need of the corresponding installation panels.

Possibilities for Applied Use
This invention, as explained in the above, is characterized by:

"A soccer ball type room structure (100) comprising a plurality of regular hexagonal first panels (10), and a plurality of regular pentagonal second panels (20) having sides of the same length as sides of said first panels (10), said first and second panels being combined with each other to form a living space inside;

said first panels (10) being fixed to first installation frames (11) having same contours as contours of said first panels, first panel end faces (11a) of said first installation

frames (11) being configured at approximately 69° relative to upper surfaces of the first panels (10) on the first installation frames (11), and the second panel end faces (11b) of the first installation frames (11) being configured at approximately 72° relative to the upper surfaces of the first panels (10) on the first installation frames (11);

said second panels (20) being fixed to second installation frames (21) having same contours as contours of said second panels, end faces (21a) of said second installation frames (21) being configured at approximately 72° relative to upper surfaces of the second panels (20) on the second installation frames."

Therefore, this invention can provide soccer ball type room structures that can provide a living space to enjoy communing with nature while they can be easily built and transported, and can be used in a stormy environment or on water.

Since the SBTRS (100) enables people to live in a more natural setting while protecting them from harsh environments, and is also easy to transport and assemble, production and sale of this product generates high industrial applicability.